

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (currently amended) A computer-implemented method of global motion estimation between frames of a motion-compensated inter-frame encoded video sequence, ~~each frame of the sequence having a plurality of motion vectors encoded therein relating the frame to a preceding and/or succeeding frame of the sequence~~, the method comprising, for a particular frame:
 - a) determining, using one or more computer processing systems, a motion estimation representative of the global motion between the particular frame and its anchor frame a first preceding or succeeding frame of the inter-frame encoded video sequence, on the basis of motion vectors therebetween directly between the particular frame and the first preceding or succeeding frame;
 - b) determining, using the one or more computer processing systems, one or more further motion estimations representative of the global motion between the particular frame and its anchor the first preceding or succeeding frame at least partially on the basis of motion vectors between the particular frame and one or more preceding or succeeding other frames; and
 - c) selecting, using the one or more computer processing systems, one of the motion estimations which meets at least one predetermined criterion as being representative of the global motion of the particular frame;
 - d) storing or outputting said selected motion estimation for use in registering the image of said particular frame with the image of said first preceding or succeeding frame.

2. (currently amended) A method according to claim 1, wherein the determining step b)

further comprises the steps of:

- e) determining one or more motion estimations representative of the global motion of the frame with respect to one or more respective preceding or succeeding other frames;
- f) determining one or motion estimations respectively representative of the global motion of the one or more other frames with respect to the anchor first preceding or succeeding frame;
and
- g) accumulating the respective motion estimations to give one or more respective overall motion estimations each substantially representative of the global motion of the frame with respect to the first preceding or succeeding anchor frame.

3. (previously presented) A method according to claim 1, wherein the selecting step c)

further comprises testing the motion estimations in turn; and outputting a motion estimation as being representative of the global motion of the frame if it passes the test, wherein the test is applied in turn to motion estimations once they have been determined, and if the test is passed then no further motion estimations are determined.

4. (original) A method according to claim 3, wherein the test comprises comparing the motion estimation with a threshold value, wherein the test is passed if the parameters of the motion estimation do not exceed the threshold value.

5. (currently amended) A method according to ~~any of~~ claim 3, wherein if the test is failed, the method further comprises:

interpolating between the motion estimations of adjacent frames to give an interpolated motion estimation which is then output as the motion estimation representative of the global motion of the frame.

6. (currently amended) A method according to claim 1 further comprising generating panoramic images from a motion-compensated inter-frame encoded video sequence, the generating comprising:

for each frame of the sequence, determining the global motion of each frame with respect to ~~its the anchor first preceding or succeeding~~ frame using the method of ~~any of the preceding claims~~ claim 1; and

generating at least one panoramic image representing the frames of the video sequence using the frame global motion estimations thus determined.

7. (currently amended) A method according to claim 6, wherein the generating step further comprises: selecting a particular frame of the sequence as a reference frame, the plane of the reference frame being a reference plane;

for each frame other than the reference frame, accumulating the frame global motion estimations from each frame back to the reference frame;

warping each frame other than the reference frame onto the reference plane using the accumulated frame global motion estimations to give one or more pixel values for each pixel position in the reference plane; and

for each pixel position in the reference plane, selecting one of the available pixel values for use as the pixel value in the panoramic image.

8. (original) A method according to claim 7, wherein the selecting step comprises selecting a substantially median pixel value from the available pixel values for use in a background panoramic image.

9. (previously presented) A method according to claim 7, wherein the selecting step comprises selecting a substantially most different pixel value from the available pixel values for use in a foreground panoramic image.

10. (previously presented) A method according to claim 7, wherein the selecting step comprises:

calculating the mean pixel value of the available pixel values;
calculating the L1 distance between each available pixel value and the calculated mean pixel value; and
select the pixel value with the median L1 distance for use in a background panoramic image.

11. (previously presented) A method according to claim 7, wherein the selecting step comprises:

calculating the mean pixel value of the available pixel values;

calculating the L1 distance between each available pixel value and the calculated mean pixel value; and

select the pixel value with the maximum L1 distance for use in a foreground panoramic image.

12. (canceled)

13. (currently amended) A non-transitory computer readable storage medium storing a computer program or suite of programs such that when executed on at least one computer system the program or suite of programs causes the at least one computer system to perform ~~the a~~ method ~~according to claim 1 of global motion estimation between frames of a motion-~~ compensated inter-frame encoded video sequence, the method comprising, for a particular frame:

a) determining a motion estimation representative of the global motion between the particular frame and a first preceding or succeeding frame of the inter-frame encoded video sequence, on the basis of motion vectors directly between the particular frame and the first preceding or succeeding frame;

b) determining one or more further motion estimations representative of the global motion between the particular frame and the first preceding or succeeding frame at least partially on the basis of motion vectors between the particular frame and one or more preceding or succeeding other frames; and

c) selecting one of the motion estimations which meets at least one predetermined criterion as being representative of the global motion of the particular frame;

d) storing or outputting said selected motion estimation for use in registering the image of said particular frame with the image of said first preceding or succeeding frame.

14. (currently amended) A system for global motion estimation between frames of a motion-compensated inter-frame encoded video sequence, ~~each frame of the sequence having a plurality of motion vectors encoded therein relating the frame to a preceding and/or succeeding frame of the sequence~~, the system comprising:

video processing means arranged in use to:

i) determine a motion estimation representative of the global motion directly between the particular frame and its an preceding or succeeding anchor frame of the inter-frame encoded video sequence on the basis of motion vectors therebetween;

ii) determine one or more further motion estimations representative of the global motion between the particular frame and its the preceding or succeeding anchor frame at least partially on the basis of motion vectors between the particular frame and one or more preceding or succeeding other frames; and

a motion estimation selector means arranged in use to select one of the motion estimations which meets at least one predetermined criterion as being representative of the global motion of the frame.

15. (currently amended) A system according to claim 14, wherein the video processing means is further arranged in use to:

determine one or more motion estimations representative of the global motion of the frame with respect to a one or more respective preceding or succeeding other frames;

determine one or motion estimations respectively representative of the global motion of the one or more other frames with respect to the preceding or succeeding~~anchor~~ frame; and accumulate the respective motion estimations to give one or more respective overall motion estimations each substantially representative of the global motion of the frame with respect to the anchor~~preceding or succeeding~~ frame.

16. (currently amended) A ~~method~~system according to claim 14, wherein the motion estimation selector means further comprises motion estimation testing means for testing the motion estimations in turn, and providing an indication as to whether the test is passed; and output means arranged in use to output a motion estimation as being representative of the global motion of the frame in dependence on the receipt of an indication that the test was passed from the motion estimation testing means, wherein the motion estimation testing means is further arranged to apply the test in turn to motion estimations once they have been determined, and if the test is passed then no further motion estimations are determined.

17. (original) A system according to claim 16, wherein the test comprises comparing the motion estimation with a threshold value, wherein the test is passed if the parameters of the motion estimation do not exceed the threshold value.

18. (previously presented) A system according to claim 16, and further comprising motion estimation interpolation means arranged to interpolate between the motion estimations of adjacent frames to give an interpolated motion estimation, in dependence on the motion

estimation testing means indicating that the test has been failed by all the motion estimations determined by the video processing means.

19. (currently amended) A system for generating panoramic images from a motion-compensated inter-frame encoded video sequence, comprising:

a system for global motion estimation between frames of a motion-compensated inter-frame encoded video sequence as claimed in claim 14, the system for global motion estimation comprising:

video processing means arranged in use to:

i) determine a motion estimation representative of the global motion directly between the particular frame and an preceding or succeeding frame of the inter-frame encoded video sequence on the basis of motion vectors therebetween;

ii) determine one or more further motion estimations representative of the global motion between the particular frame and the preceding or succeeding frame at least partially on the basis of motion vectors between sub-parts of the particular frame and sub-parts of one or more preceding or succeeding other frames; and

a motion estimation selector means arranged in use to select one of the motion estimations which meets at least one predetermined criterion as being representative of the global motion of the frame;

and further arranged to provide global motion estimations for each frame; and panoramic image generating means for generating at least one panoramic image representing the frames of the video sequence using the global motion estimations thus determined.

20. (original) A system according to claim 19, wherein the panoramic image generating means is further arranged in use to:

select a particular frame of the sequence as a reference frame, the plane of the reference frame thereby being a reference plane;

for each frame other than the reference frame, accumulate the global motion estimations from each frame back to the reference frame;

warp each frame other than the reference frame onto the reference plane using the accumulated global motion estimations to give one or more pixel values for each pixel in the reference plane; and

for each pixel position in the reference plane, select one of the available pixel values for use as the pixel value in the panoramic image.

21. (original) A system according to claim 20, wherein the panoramic image generating means is further arranged to select a substantially median pixel value from the available pixel values for use in a background panoramic image.

22. (previously presented) A system according to claim 19, wherein the panoramic image generating means is further arranged to select a substantially most different pixel value from the available pixel values for use in a foreground panoramic image.

23. (previously presented) A system according to claim 19, wherein the panoramic image generating means is further arranged to:

calculate the mean pixel value of the available pixel values;
calculate the L1 distance between each available pixel value and the calculated mean pixel value; and
select the pixel value with the median L1 distance for use in a background panoramic image.

24. (previously presented) A system according to claim 19, wherein the panoramic image generating means is further arranged to:

calculate the mean pixel value of the available pixel values;
calculate the L1 distance between each available pixel value and the calculated mean pixel value; and
select the pixel value with the maximum L1 distance for use in a foreground panoramic image.